

2/10/16

"Everyone has a gift, some people just never open theirs." -Mr. Callahan

HW: Text page 296-297 #5-55 multiples of 5

Test 1 on Friday 2/26

AIM: What are Rational Exponents?

Warm Up:

1) Simplify: $\frac{3}{\sqrt[3]{2}} \cdot \frac{\sqrt[3]{4}}{\sqrt[3]{4}}$

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Need
a perfect
cube to
break
out.

$$\frac{3 \sqrt[3]{4}}{\sqrt[3]{8}}$$

1, 8, 27, 64, 125

$$\left(\frac{3 \sqrt[3]{4}}{2} \right)$$

2) Simplify: $\left(\frac{x^3}{y^2} \right)^{-1}$

$$\left(\frac{y^2}{x^3} \right)^1 = \frac{y^2}{x^3}$$

Is there another way to write irrational expressions (radicals)?

Ex: $\sqrt{3}$

We can express them using "Rational Exponents"
"Fractional Exponents"

$$\sqrt[n]{x^m} = x^{\frac{m}{n}}$$

★ Think: $\frac{\text{Power}}{\text{Root}}$

We can simplify radicals by rewriting them using rational exponents if needed.

root $\sqrt[5]{2^{10}}$ power

OR

$$2^{\frac{10}{5}} = 2^2 = \boxed{4}$$

$\sqrt[5]{2^{10}}$ ← exponent index

↓

$$2^2 = \boxed{4}$$

Rewrite the following using rational exponents:

$$1) \sqrt{x^3} \rightarrow x^{\frac{3}{2}}$$

$$2) \sqrt[3]{x^9} \rightarrow x^{\frac{9}{3}} = x^3$$

$$3) \sqrt[3]{x^5} \cdot \sqrt[3]{x^4} \\ \downarrow \quad \downarrow \\ x^{\frac{5}{3}} \cdot x^{\frac{4}{3}} = x^{\frac{5}{3} + \frac{4}{3}} = x^{\frac{9}{3}} = x^3$$

$$4) \sqrt{\frac{9x^{-2}}{4y^4}} = \sqrt{\frac{9}{4x^2y^4}} = \frac{\sqrt{9}}{\sqrt{4x^2y^4}} \\ \frac{9^{\frac{1}{2}}}{4^{\frac{1}{2}} x^{\frac{2}{2}} y^{\frac{4}{2}}} = \frac{3}{2xy^2}$$

$(9x)^{-2} = 9^{-2} x^{-2}$
 $9x^{-2} = 9(x^{-2})$

$$\frac{\sqrt{9}}{\sqrt{(4x^2y^4)^{\frac{1}{2}}}} = \frac{9^{\frac{1}{2}}}{(4x^2y^4)^{\frac{1}{2}}}$$

Express the following in simplest form:

$$5) 9^{\frac{1}{2}} \rightarrow \sqrt[2]{9} = \sqrt{9} = \boxed{3}$$

OR

$$6) 125^{\frac{1}{3}} \rightarrow (\sqrt[2]{9})'$$
$$\rightarrow \sqrt[3]{125} = \textcircled{5}$$

$$7) (3 \cdot 12)^{\frac{1}{2}} \rightarrow 36^{\frac{1}{2}} = \sqrt[2]{36} = \sqrt{36} = \boxed{6}$$

8) True or False

$$\left(\sqrt[3]{x}\right)^2 = \sqrt[3]{x^2}$$

$$X^{\frac{2}{3}} = X^{\frac{2}{3}}$$

